

Operational Art and The Sustainment Warfighting Function

**A Monograph
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Abstract

OPERATIONAL ART AND THE SUSTAINMENT WARFIGHTING FUNCTION by MAJ
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With the rapidly changing and unfamiliar global environment, the U.S. Army must require its planners to have an understanding of operational art within the context of their warfighting function and combat power. How can an operational planner ensure that the warfighting functions are integrated and contribute to the planning team's mutual understanding of the environment? More specifically, what must a planner do to increase his contribution to a planning team? This monograph asserts that knowledge of operational art is necessary in order for the six warfighting functions to integrate effectively during the planning process.

From the viewpoint of sustainment, this monograph explores the possibilities of the sustainment warfighting function implementing the common language of operational art. This can enable an understanding of the capabilities and requirements both inside and outside the warfighting function. The sustainment principles, derived from both historic case studies and experiences gained from previous operations, can be translated into useful terminology that illustrates best practices. The principles are a collection of best practices that describe important considerations during sustainment operations. Principles of sustainment provide a frame of reference and terminology to describe a desired output for sustaining military operations. In addition to the common language, the monograph shows the relationship between combat power and the sustainment warfighting function to suggest that combat power is the common thread that exists among all warfighting functions.

Case studies provide evidence that use of operational art can increase the sustainment warfighting function's overall contribution to the planning process by translating sustainment principles into useful operational art terms. Operational art and combat power are the concepts that unite all warfighting functions. Capitalizing on this assessment can provide a planner the approach necessary to improve his contribution and improve the effectiveness of the planning team.

All in all the responsibility to practice operational art falls to the individual planner. This will be the only method to implement the foundations of operational art until each warfighting function standardizes the education of its members. The concepts of operational art are too useful to wait until the future staff planner is formally educated. This monograph recommends that the elements of operational art be introduced to an officer earlier in their career.

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Introduction

The evolution of operational art began after Napoleon when it became increasingly useful to manage large armies beyond the decisive single battle. This increase in scale and scope required military planners to synchronize movement and coordinate the sustainment of the units in order to provide a field commander the means to achieve their military objectives as dictated by the strategic powers. James J. Schneider states that because of the tremendous burden placed upon the planning elements and resources, operations had to be conducted in discrete chunks of activity.¹ This idea led to the beginnings of the operational artist and the methodology to integrate the “chunks” in time, space, and purpose in order to achieve the endstate and conditions as directed by the commander. An example of chunking is evident in the concept of separating the six elements of combat power (Warfighting functions) for analysis during operations.²

The US Army doctrine chunks operations by activity and purpose through the six warfighting function. The challenge for the operational planner is determining the most efficient way to integrate them in order to determine the tactical actions necessary to achieve the military objectives. More specifically, what can a sustainment planner do to enable a more effective integration of the sustainment warfighting function with the other warfighting functions? With the rapidly changing and unfamiliar global environment, the U.S. Army must require its sustainment planners to have an understanding of operational art. This monograph asserts that operational planners should have knowledge of operational art in order to integrate for the six warfighting

¹ James J. Schneider, "The Loose Marble - and the Origins of Operational Art, " *Parameters*, March 1989, 88. The term chunk can refer to an aspect of cognitive psychology where humans group information into seven (plus or minus two) pieces. The term chunking is referenced in Mary Jo Hatch's *Organization Theory*, 9

² A warfighting function is group of tasks and systems (people, organizations, information, and process) united by a common purpose-- mission command, intelligence, protection, fires, sustainment, and movement & maneuver--that commanders use to accomplish a mission. Department of the Army, *FM 3-0 Operations* (Washington, DC: Headquarters, Dept. of the Army, 2011), 4-3

functions to integrate effectively during the planning process. The case studies provided within this monograph show that the concepts found within sustainment can be translated into the elements of operational art. The case studies provide evidence that understanding and using the elements of operational art to describe the sustainment processes and vice versa can increase the sustainment planner's contribution to the planning process.

The sustainment warfighting function uses principles derived from historical case studies and experiences gained from past operations. They are a collection of best practices that describe important considerations to be made during sustainment operations. Principles of sustainment provide a frame of reference and terminology to describe a desired output for sustaining military operations. It is not hard for an operational planner to find best practices and new technology when doctrine, professional magazines, and various other forums provide "best" and "new" ideas whetted in the concepts of operational art. Numerous military publications outline various techniques and practices that illustrate how to apply the elements of operational art to the planning process.

In contrast, within the sustainment community, there are few articles discussing the potential of operational art within the context of sustainment. A quick query of recent sustainment articles shows that a majority of the articles discuss techniques and practices that illustrate the "how to" used by UPS, FEDEX, and other similar organizations. This gives the appearance that the sustainment community is hunting outside of itself for something new and improved. The solution for something new, however, is much closer than the sustainment community realizes; it lies within doctrine in the form of the principles of sustainment, and the elements operational art.

Understandably, there is a time and place for augmenting current sustainment planning instruments with reliable civilian best practices. However, without a fundamental understanding of operational art, the sustainment warfighting function's contribution to the planning process is less effective. Rear Admiral Henry E. Eccles sums it up: "When the fundamentals are understood, the technical details can be more readily developed. When the fundamentals are ignored or not

understood, no amount of technical skill and effort can compensate.”³ “ Fundamentals are the foundation of an enterprise discipline,” says veteran logistics educator Donald Bowersox. “In civilian logistics, the fundamentals reach every aspect including transportation, inventory management, warehousing, and material handling.”⁴ The difference between civilian logistics and military sustainment is the importance to collaborate with the other warfighting functions and integrate the sustainment capabilities with the overall campaign plan without taking away from the efforts of the other warfighting functions.

Most Operational Planning Teams (OPT) are made of a unit’s staff members representing the six warfighting function. The varying experiences and education within each of the warfighting functions increases the challenge in efficiently achieving common understanding. Using specific warfighting function terminology aids in creating a mutual understanding among members of the same warfighting function. However, sustainment officers may have difficulty communicating capabilities using terminology that the maneuver community recognizes due to a lack of understanding of the sustainment principles, elements, processes, etc. A seasoned operational planner may be well versed in his functional area yet barely fluent in others, thus limiting the overall effectiveness of the planning team.

Who has not heard of a sustainment planner providing fuel status in thousands of gallons? Without the knowledge needed to calculate gallons of fuel to operating time or miles, the other warfighting functions do not understand the implications involved with the concept of fuel to time that are obvious to the sustainment planner. This can be attributed to not understanding the purpose of the information provided by the sustainment warfighting function. In this case the

³ Kristina O'Brien, "Logistics Pioneer: Rear Admiral Henry E. Eccles," *Air Force Journal of Logistics* Annual, XXXIV, no. 1+2, 74-88, accessed May 10, 2011, <http://www.aflma.hq.af.mil/shared/media/document/AFD-101122-024.pdf>

⁴ Executive Briefing “ The Fundamental Importance of Understanding Logistics Fundamentals” SupplyChainBrain, March/April, 2011, 34

OPT's inability to translate consumption rates into time or miles gives the false understanding of the unit's operational reach. Without the operational experience to convert gallons to number of hours or miles, the information is of little use to anyone on the planning team except the sustainment planner. Simply providing information is not enough; one must provide usable data in terms that are commonly understood by everyone. Since an Operational Planning Team is comprised of experienced planners, the source of misunderstanding may be an issue of communication rather than proficiency.

According to Jomini, a good definition leads to clear ideas.⁵ Adding an understanding of operational art to the sustainment warfighting function can result in improvement to the military planning process. Doctrine is defined as fundamental principles by which the military guides actions in support of national objectives.⁶ Doctrine provides a common ground that enables a mutual understanding between warfighting functions. Operational art is the link that binds the six warfighting functions as each focuses on providing the commander with combat power. Combat power can serve as the purpose of each warfighting functions, since each share an interest in combat power's arrangement, employment, deployment, or sustainment.

Using the sustainment chunk to show that a warfighting function can implement the elements of operational art into its principles and concepts, this monograph contains five sections. Section 1 discusses operational art and the sustainment warfighting function beginning with the definitions from U.S. Army Field Manuals (FM) *3-0 Operations* and *FM 4-0, Sustainment*. Section 2 discusses combat power as a message that each warfighting function planner must communicate to the rest of the planning team and operational art is the common language connecting warfighting functions. Section 3 is a case study that illustrates deploying, sustaining,

⁵Antoine Henri De Jomini, *The Art of War* (St Paul, MN: MBI Publishing Co, 2006), 252

⁶Department of the Army, *FM 1-02 Operational Terms and Graphics*. (Washington, DC: Headquarters, Dept. of the Army, 2004) 1-65

arranging, and applying combat power during Operation Iraqi Freedom (OIF). Section 4 is a case study that illustrates deploying, sustaining, arranging, and applying humanitarian aid to the victims of the 2010 Haiti earthquake. Using the sustainment warfighting function as a lens, both case studies provide examples of combat power across the full spectrum of military operations. Section 5 concludes the monograph by reiterating that operational art, within the context of combat power, is necessary for providing and maintaining mutual understanding within the planning team.

Section 1: Operational Art and Sustainment

The arrangement between operational art and the sustainment warfighting function is best summed up with Clausewitz's description of war where everything looks simple, but the simplest thing is difficult.⁷ To a novice planner, the two can look like simple concepts that each provides information to campaign planning. However, with experience the two concepts look separate, but are actually complimentary and interdependent. Essentially, there cannot be one without the other, since sustainment builds the physical combat power that operational art arranges to achieve strategic aims.

The purpose behind the theory of operational art is to develop a flexible approach, as opposed to a method or technique, applicable to any situation regarding military operations. The same applies to the theory behind sustainment, even though sustainment is often discredited as an art due to its reliance on tables, checklists, and charts. The subsequent paragraphs discuss the

⁷ Carl Von Clausewitz, *On War*, Michael Howard and Peter Paret, ed. and trans. (Princeton, NJ: Princeton University Press, 1989), 119

purpose, elements, and principles of both operational art and the sustainment warfighting function.

Operational Art

In basic form, operational art binds appropriate tactics to strategy to achieve desired ends with the most effective means. The newest doctrine--*Army Doctrinal Publication (ADP) 3-0, Unified Land Operations*-- defines operational art as the pursuit of strategic goals, in whole or in part, through the arrangement of tactical tasks in time, space, and purpose.⁸ It reflects a holistic understanding of the operational environment, the problem, and the efficient application of resources. However, operational art is more than a way to think; it also provides a conceptual framework comprised of eleven elements, which practically enables a commander to apply combat power to achieve strategic objectives.

The Elements of Operational Art

FM 3-0 Operations defines eleven elements of operational art: Endstate and Condition, Centers of Gravity, Direct or Indirect Approach, Decisive Points, Lines of Operations/Effort, Operational Reach, Tempo, Simultaneity and Depth, Phasing and Transitions, Culmination, and Risk.⁹ This list is meant only as a tool for analysis, serving only as a point of departure for the novice and a base of reference for the expert. The eleven elements promote unity of effort, timely resource integration, and fundamental risk mitigation to military operations.

Of the eleven elements, endstate and conditions describe what the commander desires to achieve. An endstate describes the desired conditions and may change as the commander

⁸ Department of the Army, *ADP 3-0 Unified Land Operations- Final Approved Draft* (Washington, DC: Headquarters Dept. of the Army, Date Pending), 9

⁹ Department of the Army, *FM 3-0 Operations* (Washington, DC: Headquarters, Dept. of the Army, 2011), 7-5

continues to understand the environment. Understanding what the endstate or the desired condition means to the operation allows the sustainment planner to apply the principles of sustainment to the operation toward a common purpose. Not only does an endstate unify the maneuver forces toward the accomplishment of a mission, it also can unify the sustainment warfighting function's capabilities that enable the maneuver forces to accomplish their mission.

Center of gravity is a product of the dominant characteristic of the belligerent.¹⁰ Dr. Joe Strange's article, "*Understanding Centers of Gravity and Critical Vulnerabilities*," uses the example of the 1991 Iraqi Republican Guard as the enemy center of gravity because of what it could do to the U.S. Army VII Corps.¹¹ Understanding the center of gravity as the other warfighting function understand it allows the sustainment warfighting function to arrange capabilities to satisfy requirements needed in application against the center of gravity. Additionally, the sustainment planner can reverse engineer the center of gravity analysis to determine vulnerabilities located in the sustainment network.

Decisive points are not centers of gravity, but the steps to apply pressure toward affecting the center of gravity. These steps are decisive in the effect they have on the center of gravity and the marked advantage they give a commander. In the context of sustainment, decisive points can fall into three categories: a facility, a process, or an output. Understanding decisive points, a sustainment planner can identify capabilities critical to the overall sustainment warfighting function. An example is losing a port critical to deployment operations and the dramatic effects this would have on operations. Additional examples of sustainment decisive points are roads, bridges, ambulance transfer points, and fuel farms. Another possible sustainment decisive point is

¹⁰ Clausewitz, *On War*, 595

¹¹ Joe Strange and Richard Irons, "Understanding Centers of Gravity and Critical Vulnerabilities: Part 1," www.au.af.mil/au/awc/awcgate/usmc/cog1.pdf, accessed August 18, 2011.

a process that is important to operations. The ability to evacuate wounded personnel would be an important sustainment process that is decisive to the overall operation. Effective and prompt medical treatment and evacuation on the battlefield has an important psychological effect on the morale of the troops and a cognitive effect on the commander.¹²

An operational *approach* describes how the commander will apply combat power against an enemy, either directly or indirectly. The direct approach consolidates the effects combat power against an enemy's center of gravity.¹³ Conversely, an indirect approach is defined by the application of combat power against a series of decisive points calculated to dislocate an enemy from a position of advantage.¹⁴ Each approach will use either a defeat mechanism or a stability mechanism. Either approach incorporates *lines of operation and/or effort* to provide a commander a method to define tasks, outline concepts, and allocate resources to affect an enemy system. Lines of operation may be the physical lines of communication that support the transportation of resources. Lines of effort are the conceptual groupings of tasks used to help the sustainment planner organize capabilities and resources to meet requirements. Building combat configured loads of barrier material and the transport of the CCL to units about to conduct a deliberate defense may be organized using the line of effort methodology.

Geography and sustainment can have dramatic effects on *operational reach* and ultimately lead to the culmination of operations if not properly addressed. The essence of the sustainment warfighting function centers on extending and maintaining the operational reach by providing combat power the fuel, ammunition, and personnel (and medical support) to conduct operations. *Tempo* is the relative speed and rhythm of military operations over time with respect

¹² Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations* (Boston: Kluwer Academic Publishers, 2002), 206.

¹³ *FM 3-0 Operations*, 7-5

¹⁴ B. H. Liddell Hart, *Strategy* (New York, N.Y., U.S.A.: Meridian, 1991), 327.

to the enemy.¹⁵ During combat operations, a more rapid tempo allows the commander to gain the initiative and gain a marked advantage by disallowing the enemy to regain the initiative. A quicker tempo during stability operations can help make an unstable environment more stable and peaceful. The commander's ability to control operational tempo provides opportunities to affect the environment.

Simultaneity and depth extend operations in time and space.¹⁶ The intent of simultaneity is to apply more pressure on an enemy system than it can manage effectively. The term *depth* applies to the temporal and spatial relationship between operations using multiple domains of the environment. Together, the use of simultaneity and depth overloads the enemy system by placing demands beyond the enemy's capability to successfully react. The sustainment warfighting function can apply simultaneity and depth to sustainment operations to extend operational reach or maintain the tempo. It is more important that the sustainment planner understands simultaneity and depth in relation to combat operations rather than just simultaneous sustainment operations. Arranging sustainment operations to provide the commander the ability to operate both simultaneously and in depth should be the goal of the sustainment planner.

The purpose of *phasing* is to break up a complex operation into parts that are manageable. *Transitions* mark a change of focus between phases or between the ongoing operation and execution of a branch or sequel.¹⁷ As with simultaneity and depth, a sustainment operation can be phased and have transitions. The sustainment planner can use the operation's phasing and transitions to arrange capabilities in anticipation of requirements. Understanding the purpose of phasing provides a window into the near future for the sustainment planner to forecast requirements with transitions serving as the triggers to movement

¹⁵ FM 3-0 Operations, 7-13

¹⁶ FM 3-0 Operations, 7-13

¹⁷ FM 3-0 Operations, 7-15

Culmination is when a force no longer possesses the capability to continue its current form of operations.¹⁸ History provides multiple cases where inadequate sustainment was the cause of catastrophic failure.¹⁹ The methods for avoiding culmination rest in addressing the other elements of operational art such as operational reach, phasing, operational pauses, and tempo. By collaborating with the other warfighting function the sustainment planner can identify potential culmination points that sustainment can help mitigate. Taking advantage of an operational pause to position additional supplies is an example of mitigating culmination by lessening the dependency on the movement of supplies.

This leads into the last element of operational art, which is risk. Clausewitz mentions friction being countless minor incidents that compound daily, making military operations inherently risky.²⁰ The combat environment involves both known and unknown risks. Unknown risk is part of the uncertainty of war and is a potent catalyst that can provide either opportunity or jeopardy to the forces.²¹ One misstep in military operations places a force in jeopardy or on the brink of failure. The dependency on a single mode of transportation places the sustainment network at risk of failing to provide seamless sustainment. Using multiple modes of transportation can lessen the disruption in case one mode becomes ineffective. Using a Refuel on the Move (ROM) capability can place sustainment assets at risk. However, the extension of operational reach or increase in tempo associated with this capability may provide an opportunity to the maneuver element in the future.

¹⁸ *FM 3-0 Operations*, 7-15

¹⁹ For a reference to the seriousness found among sustainment planners on Alexander the Great's staff and the propensity of a short life if campaigns fail due to sustainment, see Eric T. Wallis, "From Just In Case to Just In Time," U.S. Army Logistics University, May/June 2008, accessed October 14, 2011, doi:http://www.almc.army.mil/alog/issues/MayJun08/jitime_vs_jicase.html.

²⁰ Clausewitz, *On War*, 119

²¹ Department of the Army, *FM 3-0 Operations*, 7-15.

In applying military means, commanders and their staffs use the elements of operational art to aid thinking, understanding, and describing the operational environment.²² The conceptual elements contain terminology to use in visualizing and describing the operational approach.²³ The application of the elements to the principles of sustainment can provide a framework for understanding how sustainment can better enhance military operations.

Sustainment's Origins

Moshe Kress, a Professor of Operations Research at the Naval Postgraduate School, defines sustainment as a collection of means, resources, organizations, and processes that share a common goal of sustaining military operations.²⁴ The collection of resources is from the national industrial base with allocation determined by the operational commander in order to fulfill tactical obligations.²⁵ Refining Kress's definition using current terminology explains sustainment as an application of resources in time, space, and purpose in order to facilitate the commander's ability to achieve his military objectives.

²² Department of the Army, *FM 5-0 The Operations Process* (Washington, D.C.: Headquarters, Dept. of the Army, 2011), 3-6

²³ Department of the Army, *FM 3-0 Operations*, 7-4

²⁴ Dr. Moshe Kress is Professor of Operations Research at the Naval Postgraduate School (NPS), where he teaches and conducts research in combat modeling and related areas. His current research interests are counter-insurgency modeling, sensor deployment and operations, homeland security problems, and UAV employment in IW situations. His research has been sponsored by DARPA, ONR, USSOCOM, JIEDDO and TRADOC. He is the Military and Homeland Security Editor of the OR flagship journal *Operations Research*. He published four books (one of which has been translated into Hebrew and Korean) and over 65 papers in refereed journals. Dr. Kress has been twice awarded the Koopman Prize for military operations research (2005 and 2009) and the 2009 MOR Journal Award. Prior to joining NPS, Dr. Kress was a senior analyst at the Center for Military Analyses in Israel, and an adjunct professor at the Technion – Israel Institute of Technology. <http://faculty.nps.edu/mkress/> accessed 9Nov,2011

²⁵ Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations*, (Boston: Kluwer Academic Publishers, 2002), 40

The U.S. Army defines sustainment as the provision of logistics and personnel services necessary to maintain and prolong operations until successful mission completion²⁶ A sustainment network can consist of physical nodes (seaports, airfields, and supply facilities), connecting lines of communication (LOC) over sea, air, and land routes, and the human element that manipulates the network.²⁷ The purpose of a sustainment network is to build and maintain combat power that can endure both extended time and space until meeting strategic objectives. Sustainment is an action defined by its results that exists only to support military operations.²⁸

Shortages within a sustainment system are forgivable if temporary and caused by circumstances, but not if caused by an ineffective sustainment network.²⁹ From the very beginnings of warfare, there has been a requirement to feed and equip an army as it moved across the landscape between battles. As the battlefield grew, so did the requirement to muster capabilities to support the soldiers in the field. History is full of instances of great battles won or lost due to the failures of sustainment.

In Jomini's *Art of War*, logistics comprises the orders and details of marches and camps, quartering and supplying troops and is described as the art of moving armies.³⁰ Often times, sustainment is associated with science since calculations, rules, and times apply to the majority of sustainment actions. According to Major Clayton Newell's article "Logistical Art," the art of

²⁶ Department of Defense, *Joint Publication 4-0, Logistics*, (Washington, DC:, Dept. of Defense) vii

²⁷ Systems' thinking is the art of simplifying complexity. It is about seeing through chaos, managing interdependency and understanding choice. The author uses the theme of sustainment network to communicate the idea that sustainment operations are a series of nodes, facilities, and relationships between all. The reference comes from Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: a Platform for Designing Business Architecture* (Amsterdam: Elsevier, 2006), 315.

²⁸ United States Marine Corp Doctrinal Publication *MCDP 4-0, Logistics*, (Washington, DC: Headquarters Marine Corps) 11

²⁹ Clausewitz, Carl Von, *On War*, 300

³⁰ Antoine Henri De Jomini, *The Art of War*, 69

sustainment gets lost in the plethora of numbers necessary to modern sustainment planning.³¹ As the circumstances change due to human interaction, the science of sustainment can only get a planner so far. Knowing when and how to accept risk, prioritizing the myriad of requirements, and balancing limited resources all require sustainment art.

The term “math” is more applicable to the processes involved with sustainment than science. It consists of numerous specialized automated processes, spreadsheets, tables, and charts that convey past, present, and future uses of sustainment. This is basic math; number of known personnel multiplied by a known planning factor multiplied by a known duration equals the requirement. Initiate the capability that fills the requirement and request more capability if the requirement exceeds the capability. Sustainment is rooted in math; however, as in good math, good sustainment still requires artful application.

The art of sustainment incorporates experience, intellect, creativity, intuition, and education much like operational art does. Current technology provides calculations in the form of the Logistics Estimate Worksheet (LEW), Operational Logistics Planner (OPLOG Planner), and numerous variations of Excel spreadsheets that allow the forecasting of requirements. Each of the warfighting functions depend on technology to analyze data and provide information. However, the friction of war can always disrupt these scientific calculations, requiring planners from each warfighting function to apply creativity to meet demands.

The Sustainment Warfighting Function

The sustainment warfighting function is broken into three distinct groups: logistics, personnel services, and health services. The integrative process links personnel, material,

³¹ Clayton Newell, "Logistical Art, "Parameters" XIX (March 1989): 32 accessed September 13, 2011, <http://www.carlisle.army.mil/usawc/Parameters/Articles/1989/1989%20newell.pdf>.

maintenance, medical/health services, and supply services to military operations.³² The sustainment warfighting function consists of several processes that result in the *functions of sustainment*, which includes all classes of supply, field services, transportation, maintenance, general engineering, human resources, finance, legal, religious support, and Army health services support.³³

The Principles of Sustainment

Similar to the elements of operational art, *Field Manual (FM) 4-0 Sustainment* distinguishes eight principles of sustainment: *integration, anticipation, responsiveness, simplicity, economy, survivability, continuity, and improvisation* from “*best practices*” derived from historical experience from sustainment operations. The principles of sustainment provide terminology to describe desired outputs that support and sustain military operations. Each principle is a single point; however, it is important to remember that each principle interacts with the other principles.

The principle of *integration* is an ongoing process that provides the linkage between the sustainment principles as a whole. *Anticipation* is foresight, prudent regard, or provision for the future. Sustainment foresight is about assessing the current conditions for the possibilities of opportunities or defeat within the concept of the operations. Foresight is a necessary property for an operational plan to be sustainable.³⁴

³²Department of the Army, *FM 4-0 Sustainment* (Washington, DC: Headquarters, Dept. of the Army, 2009),1-3

³³ For a more detailed description of the functions of sustainment, See Chapter 5 in *FM 4-0 Sustainment* pages 5-1 thru 5-21. Chapter 5 of FM 4-0 defines the functional elements of sustainment as supply, field services, transportation, maintenance, general engineering, human resources, FM, legal, religious support, and Army health services support. These elements and their many sub-functions comprise the sustainment warfighting function. When optimized, sustainment operations ensure strategic and operational reach and endurance for Army forces in any operational environment Department of the Army, *FM 4-0 Sustainment* (Washington, DC: Headquarters, Dept. of the Army, 2009),5-21

³⁴ Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations*, 59.

Responsiveness affects the combat unit's ability to maintain its operational momentum. The complex and fuzzy element of responsiveness refers to all the sustainment factors that generate combat power and retain the vitality and fitness of the force over time and space.³⁵ Responsiveness describes the actions that get the right stuff to the right place at the right time by using every available system to forecast, store, and transport despite a rapidly changing environment.

Dietrich Dorner's *Logic of Failure* defines complexity as the existence of many interdependent variables in a given system.³⁶ *Simplicity* strives to minimize the complexity of the sustainment network.³⁷ Time, space, and resources are general (simplistic) examples of variables that affect a sustainment network. Variables that are more specific are the production and delivery time, vehicle maintenance space, crew welfare, consumption rates, weather effects and enemy actions along supply routes. The focus of simplicity is in ensuring a process or procedure is efficient and manageable and does not complicate the overall objective.

The principle of *economy* is a derivative of the principle of war known as economy of force. Disciplined sustainment actions assure the greatest possible endurance of the force and constitute an advantage.³⁸ *Survivability* sets military sustainment apart from those operations conducted by Wal-Mart and its army of suppliers. *FM 4-0, Sustainment*, defines survivability as the ability to protect personnel, information, infrastructure, and assets from destruction or degradation.³⁹

³⁵ Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations*, 83.

³⁶ Dietrich Dorner, *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations* (Reading, MA: Addison-Wesley Pub., 1997), 38.

³⁷ Department of the Army, *FM 4-0 Sustainment*. (Washington, DC: Headquarters, Dept. of the Army, 2009), 1-3

³⁸ *FM 4-0 Sustainment*, 1-3

³⁹ *FM 4-0 Sustainment*, 1-3

Continuity is the principle that defines the uninterrupted provision of sustainment across all levels of war.⁴⁰ It either makes or breaks the sustainment network in the eyes of the maneuver force. A single disruption will reflect the inability of the sustainment network to support operations, regardless of the reason for the disruption. The use of dedicated routes, aerial resupply, forward positioning of supplies, and movement control systems enable seamless support in the event of a disruption along a main supply route.

The principle of *improvisation* is the ability to adapt sustainment operations to unexpected situations or circumstances affecting a mission.⁴¹ As conditions change for the forces on the battlefield, so do the requirements to sustain the force. The concept of friction explains that the effects of variables such as weather, fatigue, miscommunications, and equipment failures cause disruptions to the sustainment network. Kress notes that improvisation does not replace anticipation; it compliments anticipation when things do not happen as planned.⁴²

The principles of sustainment are guidelines to achieve success using the best tools available. Principles do not assert anything more than a possible cause and effect relationship within sustainment operations. Elements and principles may not fit each situation as in the past, so planners must be cautious of the “checklist” trap, which can lead to shortfalls and missteps. LTG Christianson offers this advice to young sustainment officers: “In an uncertain world, if the solution is to apply a fixed template, you are going to fail.”⁴³

⁴⁰ FM 4-0 Sustainment, 1-3

⁴¹ FM 4-0 Sustainment, 1-3

⁴² Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations*, 60.

⁴³ Claude Christianson, LTG (ret) from an interview in AUSA News “Creating Education Plan Is Key to Developing ‘critical Thinkers’ in Logistics Community,”

Section 2: Combat Power and Operational Art: Common Message and Common Language

Sustainment, as are the other warfighting functions, is integral to operational art.

Unfortunately, few sustainment officers below the rank of Lieutenant Colonel understand and apply operational art to sustainment operations. Many officers have difficulty communicating sustainment capabilities using terminology that the other warfighting functions can understand. The obvious cause might be an education process that focuses mainly on the science and little on the art. This may be by design since tactical sustainment actions consume much of an officer's career prior to the grade of Major. However, sustainment is not restricted to a level of war and an officer can be assigned outside the level of tactical actions. This might explain why there is a tendency to focus on the technology instead of applying the elements of operational art in the context of sustaining combat power to improve warfighting function contributions to the planning process.

One would assume that the sustainment doctrinal manual FM 4-0 would address the elements of operational art, or at least reference FM 3-0, as a method to communicate sustainment functions. Unfortunately, the 2009 *FM 4-0: Sustainment* only mentions operational art one time.⁴⁴ A single reference to operational art without a citation for further reading might illustrate a lack of endorsement or an untimely delay in updating doctrine. To a sustainment officer, it appears to be the former rather than the latter explanation since operational art is lacking from most professional development curriculum as well. Imagine if the sustainment warfighting function could express its separate principles, theories, values, and elements using a common language to enable mutual understanding of its capabilities and requirements. The

⁴⁴ The sustainment commander must apply operational art to visualize complex operations and understand what is possible at the tactical level. Department of the Army, *FM 4 Sustainment*. (Washington, DC: Headquarters, Dept. of the Army, 2009) 1-4

improvement in efficiency and effectiveness would be tremendous compared to processes today. Even with a common message, is there a common language that promotes understanding between team members of varying warfighting functions and backgrounds? This section offers the concepts of operational art as a common unifying language with combat power as the common message.

Combat Power: A Common Message among Warfighting Functions

The common purpose that focuses the analytical output of the six warfighting functions is the ability to build combat power at a specific time and place in order to seize, retain, and exploit the initiative to gain a position of relative advantage over the enemy. Doctrinally, combat power describes the total means of destructive, constructive, and information capabilities that a military unit/formation can apply at any given time.⁴⁵ Across the full spectrum of operations, combat power can take the form of a brigade combat team conducting a deliberate attack in offensive combat operations to vehicles organized to distribute humanitarian relief supplies during disaster relief operations.

According to *FM 3-0, Operations*, all units either apply or maintain combat power and contribute to operations.⁴⁶ In this case, the term units refer to warfighting functions and the prepositions (of, for, on, and with) indicate the temporal, spatial, and logical relationship to combat power (e.g. sustainment of combat power, intelligence for, protection of, etc.). Each warfighting function produces separate analysis that results in information, or a message, that concerns combat power. This message describes the capabilities, requirements, and shortfall within the context of combat power as it relates to the specific warfighting function. It is the

⁴⁵ Department of the Army, *FM 1-02 Operational Terms and Graphics*. (Washington, DC: Headquarters, Dept. of the Army, 2004) 1-35

⁴⁶ Department of the Army, *FM 3-0 Operations*, 7-4

responsibility of the operational planner to translate and synchronize each message in order to provide a complete synthesis for the commander.

Varying perspectives and experiences will define suitable combat power differently. Without a unified concept of suitable combat power, the task to synchronize the warfighting functions will be difficult. In the beginning of the planning process, the operational planner should outline criteria that describe suitable combat power. A clear definition of what combat power needs to be (in order to achieve specific military objectives) will help the operational planning team understand the capabilities, requirements, and shortfalls associated with combat power necessary to accomplish military objectives. This will enable integration between the warfighting functions.

This monograph will consider precision, effectiveness, endurance, projection, and efficiency to define suitable combat power. Precision facilitates getting the right combat power to the right place at the right time to meet a commander's timeline and supports subsequent phases. Effective combat power provides the commander the desired effects. Endurance ensures that combat power is available and can withstand the effects of the operational environment. Projection of combat power is important since operations may require an entry into a theater of operations. Finally, combat power ought to be as efficient as possible in regards to the consumption of resources—cost, personnel, time, maintenance, etc.

In the basics of sustainment, the focus on combat power stands out in the three phases of a sustainment operation: Establish, Deploy, and Employ.⁴⁷ Most sustainers can agree that, in a basic sense, the three elementary phases of sustainment operations involve actions focused on the

⁴⁷ The establish phase focuses on creating the infrastructure in the theater of operations. The objective of the establish phase is to select nodes, facilities, and lines of communication. The deployment phase focuses on the accumulation and positioning of resources in the theater of operations. The employment phase is the actual implementation of the sustainment network to sustain a theater of operation. Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations* (Boston: Kluwer Academic Publishers, 2002), 47

building and sustaining of combat power. First, the theater opening elements establish the airfield, seaports, and facilities that will support building combat power. Second, the deployed units conduct the reception, staging, onward movement, and integration (RSOI) of the combat units conducting the operation. Finally, sustainment units provide seamless support to combat power as it is employed forward to conduct tactical tasks. Regardless of the three phases, building and sustaining combat power is the responsibility of the sustainment warfighting function.

A typical sustainment network can consist of physical nodes (seaports, airfields, and supply facilities), connecting lines of communication (LOC) over sea, air, and land routes, along with the human element that manipulates the network. Simply put, a sustainment network is more complex than just facilities in a theater of operations. Regardless of the physical makeup, geographical location, or number of personnel associated with the sustainment network, it has a single allegiance. The sustainment warfighting function concentrates on the processes that assemble and support combat power within the Areas of Operations. Combat power is a common purpose that planners can use as a common focus for the six warfighting functions.

Operational Art: The Common Language that Unites the Warfighting Functions

As Major Milo Shank, United States Marine Corps, states, “Time, distance, and physical means apply to everything in war from the strategic to the tactical. Being able to measure these factors and ascertain the best course of action is critical to operational art.”⁴⁸ Operational art uses a common language to describe concepts, theories, history, and experiences that cover the attributes of military operations collectively. As previously defined, operational art is the pursuit

⁴⁸ Milo I Shank, *Art or Science: Operational Logistics as Applied to Operational Art*, thesis, Newport RI/ Naval War College, 2006 (Newport, RI: Naval War College), 10

of strategic objectives, in whole or in part through the arrangement of tactical actions in time, space, and purpose.⁴⁹

Defining sustainment as the application of resources in time, space, and purpose in order to facilitate the commander's ability to achieve his military objectives illustrates sustainment's linkage to operational art. The two are inseparable and interdependent.⁵⁰ Most planners understand the importance of sustainment to operations. This is not an issue among planners. The real issue is the inability to effectively communicate information in terms that are useful in defining the capabilities and requirements necessary to accomplish the commander's objectives.

Understanding the purpose of a warfighting function can improve the planning process. The sustainment planner could brief the need for X number of gallons, or provide the consumption of fuel calculations resulting in Y hours or D miles. However, by using the terms *operational reach* and *culmination* to describe the fuel capability, the sustainment planner can provide the same information but communicate a much clearer picture to the planning team. There is more to being an operational planner than gathering information and knowing how to process it. It is the planner's understanding and communication of that understanding that adds value to the planning process.

In Moshe Kress' *Operational Sustainment*, operational harmony is defined as the operational-sustainment synchronization that facilitates consistency among operational objectives.⁵¹ Specific operational art concepts and terminology provide the desired common understanding that could improve the efficiency of an operational planning team. Operational art

⁴⁹Department of the Army, *ADP3-0 Unified Land Operations*, (Washington, DC: Headquarters, Dept. of the Army, 2011), 9

⁵⁰ Steven T. Mitchell, *Operational Art and Its Relevance to Army Logistics*, thesis, Fort Leavenworth KS/ School of Advanced Military Studies, AY99-00 (Fort Leavenworth, KS: United States Command and General Staff College, 2000), 20.

⁵¹ Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations*, 59

can provide a common language between warfighting functions when describing capabilities, requirements, risks, and opportunities.

The eight principles of sustainment offer concepts to consider when planning, preparing, executing, and assessing sustainment operations. Being fluent in the principles can assist a planner with conceptual integration into the operational art framework. Each principle has a relationship with each of the others, as discussed in the previous section. This section asserts that each principle of sustainment can apply to the elements operational art.

Blending the two conceptual schemas can provide the planner a useful vantage point in the planning process. For the sake of time, the values of integration, anticipation, economy, and continuity will illustrate that a principle of sustainment can be better understood using concepts of operational art. Simply put, sustainment principles can be translated into the common language of operational art.

Integration is important internally and externally to the sustainment warfighting function. In operational art, the elements of endstate and condition, center of gravity, and operational approach provide the operational planner the context necessary to determine what actions need to be taken to achieve strategic objectives, in whole or in part. The importance of integration is not how it is translated, but that sustainment capabilities and requirements are incorporated across the warfighting function boundaries to ensure operational harmony. Members of the sustainment warfighting function must use operational art to understand phasing and transition in order to ensure the right application of sustainment resources to support military operations. History has numerous instances where the lack of integration between warfighting functions lead to failure.

While some sustainment events, such as refueling operations, are event driven the majority are time driven.⁵² Therefore a sustainer cannot wait forever to act, but must try instead to

⁵² Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations*, 46

determine the direction that the entire system is heading.⁵³ Anticipatory sustainment can prevent culmination by forecasting when a force will require sustainment and have the appropriate capability positioned to meet the requirement in a timely manner. The sustainment principle of anticipation, in collaboration with improvisation, responsiveness, and simplicity, forms an element of flexibility. By applying the principle of anticipation, a sustainment network can extend operational reach resulting in greater flexibility to maintain tempo, mitigate risk, or exploit opportunity. The use of phrases such as operational reach, maintain tempo, risk mitigation, and exploit opportunities promotes a better understanding among the other warfighting functions.

Setting the priority of either support and/or movement is characteristic of an economical and efficient sustainment network. The application of economy provides resources in an efficient manner enabling a commander to employ combat power to generate the greatest effect possible.⁵⁴ A sustainment planner applies the principle of economy by using lines of operation (LOO) that include decisive points known as nodes. For example, consider air and sea lines of operation required in opening up a theater. The air line of operation transports a large number of personnel and the sea line of operation transports a large amount of equipment. Both the airport and seaport are considered nodes that are decisive to the deployment process. Giving each domain its own line of operation simplifies the process and economically generates combat power in a theatre of operation.

Lines of effort link multiple tasks and missions using the logic of purpose—cause and effect—to prioritize efforts toward establishing operational and tactical conditions.⁵⁵ Similar to lines of operation, lines of effort provide a method to understand the environment and put

⁵³ Dietrich Dorner, *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations*, 40.

⁵⁴ Department of the Army, *FM 4-0 Sustainment*, 1-3

⁵⁵ *FM 3-0 Operations* 7-10

resources against demands. The uninterrupted flow of resources to the maneuver elements can be considered a line of effort that extends their operational reach. During defensive operations, the ordering, configuring, and transporting of Class IV (barrier material) packages for use at the forward battle areas can be a line of effort. Consider a functional line from the originating lumberyard to the defensive line of bunkers with stockage objectives and delivery locations as decisive points along this Class IV line of effort.

Operational reach defines a boundary for the operation that is supportable by the sustainment network.⁵⁶ From the sustainer's point of view, relating operational reach in terms of time and space provides a more suitable definition. Similar to the way a sustainment planner communicates gallons of fuel to a commander using time, space, and purpose, operational reach can be thought of in terms of days of sustainment (DOS) or the distance a unit can travel. The sustainment planner must consider the strain on the sustainment network and the economy and survivability of sustainment units along the lines of operation as maneuver elements continue to exploit their gains against the enemy.

Continuity of the sustainment network provides a commander the flexibility to maintain a more rapid tempo. This allows the commander the freedom of maneuver necessary to take the initiative. The ability to control operational tempo provides opportunities to affect the environment, therefore it is important that the sustainment network operate without a disruption to the throughput of resources. In addition to the maneuver forces, the resulting flexibility may create opportunities that the other warfighting functions can exploit. Phasing can break up a complex operation into manageable parts with transitions marking a change of focus in priority of support and effort.⁵⁷ An example is the transition between offensive and defensive operations that

⁵⁶ Moshe Kress, *Operational Logistics: the Art and Science of Sustaining Military Operations*, 43

⁵⁷ *FM 3-0 Operations*, 7-15

allows the sustainment network to change focus and priority of support. During offensive operations, the priority of support may be fuel then ammunition. Conversely, during defensive operations the priority of support might be ammunition then fuel due to the limited mobility required. Knowing when transitions occur between phases is important to the sustainment network and the overall success of the operation. Deliberate transitions and sequencing provide the sustainment warfighting function a way to control priorities, efforts, and tempo to the unfolding of the overall operation.

A Common Message and the Language that Unites the Warfighting Functions

During a recent exercise, a staff conducts Mission Analysis that determines the maneuver force has an operational reach of 100km. However, the objective is 400km from the port of entry. To illustrate the concept of operational reach, consider an individual armored vehicle with a fuel cell capacity of 550 gallons. Since the vehicle uses a constantly operating jet turbine, the consumption of the fuel is in time, not miles. At approximately fifty-five gallons-an-hour, the vehicle can operate for ten hours unimpeded by sustainment. To maintain tempo, the sustainment officer suggests the Refuel on the Move (ROM) capability to extend operational reach, also applying the principles of anticipation and continuity.

The principle of integration can be applied in two ways. First, integrating the Refuel on the Move capability into the scheme of maneuver can result in extending the armored column's range in both time and space allowing more time to cover greater distance. Second, integrating the Refuel on the Move capability with the armored column's movement uses the principle of economy. Utilizing the armored column to provide security for the Refuel On the Move element's movement allows the sustainment network to use organic security elsewhere in the network.

For sustainment operations, simultaneity and depth across a theater enable responsiveness and continuity by increasing the network's economy and survivability. To ensure sustainment augments operations by extending operational reach, a planner may suggest theater-level fuel assets to conduct the Refuel on the Move. This can allow a unit to maintain its fuel assets at

capacity and be continuously available for use as the armored column moves in depth. In essence, simultaneity and depth of the fuel operation enable the extension of operational reach through the sustainment principles of economy, anticipation, and continuity.

It is important that the sustainment planner understand and use the best words to describe the sustainment contribution to military operations. The previous example shows how the sustainment warfighting function uses a common language to communicate the message explaining how the armored column commander will receive fuel for 400km. Warfighting functions either apply or maintain combat power; therefore, combat power provides a common focus among the warfighting functions. The terminology of operational art provides a way to express a warfighting function's contributions when either applying or maintaining combat power.

The best way to illustrate the common ground between the six warfighting functions is to provide historical examples. The initial events in Operation Iraqi Freedom and the 2010 disaster relief to Haiti serve as illustrating examples below.⁵⁸

Section 3: Campaign Analysis – Operation Iraqi Freedom

Iraq 2003: Historical Background:

While combat operations began on 17 March 2003, preparations, albeit unknowingly, for Operation Iraqi Freedom began on 1 March 1991—the day after the first Gulf War ended.⁵⁹ The involvement of U.S. Forces in the Persian Gulf region has long lines that trace back through history. Most notably, before the terror attacks on the World Trade Center and the Pentagon, are

⁵⁸ Carl Von Clausewitz, *On War*, 170

⁵⁹ Gregory Fontenot, E. J. Degen, and David Tohn, *On Point: the United States Army in Operation Iraqi Freedom* (Fort Leavenworth, Kan.: Combat Studies Institute Press, 2004), xxi.

the 100-hour war to liberate Kuwait from Iraqi control and the involvement of U.S. Navy vessels in the Straits of Hormuz guarding reflagged Kuwaiti oil tankers from Iran. Although separated by time and actors, each event contributed to the relationship between the United States and Kuwait, a relationship that would become important in 2003. Cooperation between the two nations continued to grow as Saddam Hussein underwent continued scrutiny regarding possible possession of Weapons of Mass Destruction (WMD). The combination of Saddam Hussein's history of aggression towards his neighbor with the recent attacks on America made Kuwait the right location and the right time.

Since Operation Desert Storm in 1991, Third Army has responded five times to contingency requirements to deploy, command, control, and support major Army forces to deter Iraqi adventurism.⁶⁰ In the event that Iraq was to move towards Kuwait as it did in 1990, the United States would lose the time/distance race. The solution to this problem included establishing two sets of pre-positioned equipment closer to Kuwait, the suspected target of Saddam Hussein: one at Camp Doha-Kuwait, the other a floating set. The Army War Reserves (AWR)-5 and assets of AWR-3 positioned near Kuwait allowed U.S. forces to meet the challenge with two Brigades.⁶¹ In the years leading up to March 2003, the U.S. Army exercised the pre-positioned equipment twice a year in order to validate the Reception, Staging, Onward Movement, and Integration (RSO&I) and command and control processes. Operations Intrinsic Action, Vigilant Warrior, and Vigilant Sentinel provided the environmental knowledge that became the foundation of Operation Iraqi Freedom. The pre-positioned equipment and local

⁶⁰ Global Security.org, "Operation Vigilant Warrior," GlobalSecurity.org - Reliable Security Information, , accessed October 12, 2011, http://www.globalsecurity.org/military/ops/vigilant_warrior.htm.

⁶¹ Global Security.org, "Operation Vigilant Warrior," Army War Reserve-5 is a full, heavy brigade set of equipment that is ready to fight as fast as troops can be flown into theater. ARCENT-Kuwait is able to issue at least a battalion set of that equipment every 24 hours. Army War Reserve-3, PREPO Afloat, consists of a brigade of equipment for four maneuver battalions and a direct support artillery battalion, along with its requisite combat support (CS) and combat service support (CSS) and 30 days of sustainment supplies. AWR is also referred to as Army Prepositioned Stocks (APS).

infrastructure used to maintain the equipment provided the foundation of the sustainment network that could expand to a network capable of sustaining the opening movement of the Third Infantry Division into Iraq.

The U.S. Central Command planners understood that Kuwait would serve as Saudi Arabia did in 1991, which meant Kuwaiti infrastructure would require improved capabilities to sustain a large number of troops. Kuwaiti Naval Base, Camp Doha, Camp Arifjan, and several other camps saw over \$550 million dollars worth of improvements.⁶² The need for Kuwaiti infrastructure improvements was twofold: first, the number of U.S. troops in Kuwait prior to March of 2003 was smaller than the eventual number required for conducting combat operations, and second there would be larger amounts of supplies and equipment than the current Army War Reserve warehouses could hold. As previously mentioned, the prepositioning of equipment provided the beginnings of a sustainment network capable of sustaining a task force to a Brigade size element, but would fall short of sustaining the multiple units that would use Kuwait for Reception Staging Onward movement and integration.⁶³

The bulk of the network was completed before the majority of troops began to deploy. With the massive amounts of resources applied to the Kuwaiti infrastructure post 9-11, the task of establishing the sustainment network was easily accomplished. By March of 2003, there were nine camps built to sustain the projected inflow of U.S. forces plus improvements to Kuwait seaport and airport facilities that could process the 167 ships and numerous aircraft required to move 424,000 personnel into Kuwait.⁶⁴

⁶² Gregory Fontenot, E. J. Degen, and David Tohn, *On Point: the United States Army in Operation Iraqi Freedom*, 32.

⁶³ Gregory Fontenot, E. J. Degen, and David Tohn, *On Point: the United States Army in Operation Iraqi Freedom*, 32.

⁶⁴ Paul Needham and Christopher Snyder, "Speed and the Fog of War: Sense and Respond Logistics in Operation Iraqi Freedom," www.ndu.edu, January 2009, OIF-I: An Overview, accessed

During Operation Iraqi Freedom, Central Command (CENTCOM) applied a different approach than the use of the Joint Operation Planning and Execution System (JOPES) generated process. CENTCOM required the planners to build force packages that fulfilled the capability requirement in the theater. The critical procedures for deployment, particularly the off-loading of equipment from floating prepositioning ships and its distribution to arriving soldiers, was verified in exercises at the National Training Center, Operation Bright Star in Egypt and Operation Intrinsic Action exercises in Kuwait.

With over a decade of deployments, training and stocking equipment and supplies, the United States was prepared to conduct operations at a moment's notice. In March 2003, the notice came to an army that included some modernized forces well on the way towards transformation and other forces still organized and designed for the Cold War.⁶⁵ Sustainment units from both the active and reserve component would suffer the growing pains of the Army's current situation.

The preemptive establishment of the sustainment network illustrates the effort to facilitate tempo, risk, and the extension of operational reach. The most obvious adherence is to tempo; without the earlier establishment of the sustainment network, U.S. forces would not have been capable of providing the tempo required to conduct combat operations to gain a position of advantage had Iraq invaded. The risk to the operation decreased with mature and sustainable lodgment within Kuwait. Unlike the early stages of a 1940's amphibious landing, the 3rd Infantry Division did not have to fight and hold a lodgment. The twelve years of improvements to the Kuwaiti, European, and United States' infrastructure contributed to the sustainment forces' ability to support operations from the onset of combat. With Saddam's record of success in invading

October 13, 2011,
<http://www.ndu.edu/CTNSP/docUploaded/Case%2015%20Sense%20and%20Respond.pdf>.

⁶⁵ Gregory Fontenot, E. J. Degen, and David Tohn, *On Point: the United States Army in Operation Iraqi Freedom*, 1.

Kuwait, the lodgment provided extended operational reach. The prepositioned equipment and rapid buildup compensated for Saddam's potential advantage in both time and space.

The 24th Corps Support Group (Forward) was the sustainment unit responsible for supporting elements of the 3rd Infantry Division (ID) moving into the heart of Iraq in March 2003. The concept of support developed for 3rd Infantry Division (ID) required establishing two forward logistics bases (FLB) to provide both bulk refueling and ammunition.⁶⁶ One Forward Logistics Base near An Nasiriyah (160 miles north of Kuwait City) and the other near An Najaf (160 miles north of An Nasiriyah) provided 3rd Infantry Division (ID) a continuous sustainment line of operation. The leap-frogging of Forward Logistics Bases provided 3rd Infantry Division (ID) with the level of sustainment required to conduct the mission of reaching Baghdad. The 24th Corps Support Group commander understood the operational approach and desired endstate and directed his staff to plan the establishment of the Forward Logistics Base that best supported the Division's line of operation. He also determined that his center of gravity was each Forward Logistics Base and the fuel and ammo capability within each Forward Logistics Base.⁶⁷ The result of his analysis provided guidance to his staff and highlighted the importance of establishing a command and control element responsible for building the Forward Logistics Base, while providing the command emphasis required for such an important extension of the theater sustainment network.

The 24th Corps Support Group sustained the march north into Iraq by employing Forward Logistics Bases to maintain the tempo and continuity of support required of combat operations. The actions of the 24th CSG illustrated the extension of the sustainment network with the intended

⁶⁶ Dana C. Heck, MAJ, "Tactical Employment of a Forward Command Post by a Corps Support Group," U.S. Army Logistics University, September/October 2003, accessed October 10, 2011, http://www.almc.army.mil/alog/issues/SepOct03/Tactical_Employment.htm.

⁶⁷ Dana C. Heck, MAJ, "Tactical Employment of a Forward Command Post by a Corps Support Group,"

effect of extending 3rd Infantry Division's operational reach. This extension provided the 3rd Infantry Division (ID) commander with five days of supply and the flexibility to operate with less concern over the friction of events.⁶⁸

The sustainment network's tempo ensured that personnel, supplies, and equipment were processed through the network at a tempo that supported the commander's endstate. The actions of the 180th Transportation Battalion exemplified network velocity along with principles associated with operational reach, continuity, flexibility, responsiveness, and integration. Essentially, the units of the "King of the Road" Battalion enabled the 4th Infantry Division (mechanized) to move rapidly into theater in support of V Corps operations into Iraq.

Approximately two weeks after the beginning of the ground war, the troops from the 4th Infantry Division began to arrive at the Aerial Port of Debarkation, while approximately 1500 tracked vehicles and outsized equipment began to arrive at the Sea Port of Debarkation.⁶⁹ With the ground war succeeding, the V Corps Commander directed the 4th Infantry Division (ID) to move into Iraq as soon as possible to exploit the successes of the 3rd Infantry Division.

The 180th Transportation Battalion, comprised of eight companies from varying components, with 375 Heavy Equipment Transporters (HET) began operations within twenty-four hours of receiving the mission. The heavy equipment upload location near the red and white radio tower served as a rallying point for both 4th Infantry Division (ID) units and Heavy Equipment Transporters crews. The intent was to load up the organizations near the intersection of Range Road and Iron Horse Trail, then integrate the Heavy Equipment Transporters into wheeled convoys and drive 450 miles to the Tactical Assembly Area (TAA) near OBJECTIVE

⁶⁸ Dana C. Heck, MAJ, "Tactical Employment of a Forward Command Post by a Corps Support Group,"

⁶⁹ David G. Cotter, LTC, "The Iron Horse Express," U.S. Army Logistics University, September/October 2003, accessed October 10, 2011, http://www.almc.army.mil/alog/issues/sepoct03/iron_horse.htm.

SAINTS south of Baghdad. In a radical shift from peacetime movements, the crews rode inside the vehicles loaded on Heavy Equipment Transporters.⁷⁰ This illustrated the principle of economy by providing much-needed security to the convoys, as combat crews operated their vehicle-mounted weapons from the trailers of the Heavy Equipment Transporters.

Averaging forty-eight hours to complete a round trip, 180th Trans operated non-stop. However, the fatigue of non-stop operations began to take a toll on the Heavy Equipment Transporter crews. Lieutenant Colonel Cotter advocated a risk mitigation consisting of a 6-hour break between trips and directed the Heavy Equipment Transporters to conduct convoys to Objective Saints without integrating with the other wheeled convoys. The increase in convoy speed resulted in a complete trip being shorter, therefore providing the Heavy Equipment Transporter crews opportunity to rest.⁷¹ This decision maintained the tempo first established by the 180th during non-stop operations while mitigating the risk of a catastrophic accident due to crew fatigue.

At the completion of the move of 4th Infantry Division (ID), 180th Trans had moved 1500 pieces of equipment, which extended the operational reach of a heavy armored formation by 200 miles. The rapid move of 4th Infantry Division (ID) allowed the replenishment of 3rd Infantry Division (ID). With both divisions in position, this provided V Corps the flexibility to operate simultaneously and in depth with two heavy divisions. The elements of the 180th Trans were instrumental in providing the V Corps Commander the flexibility to paralyze and produce the early culmination of the Republican Guard.

The Army sustainment operations during the opening days of Operation Iraqi Freedom were successful overall. The sustainment network foundation provided sustainment support until

⁷⁰. David G. Cotter, LTC, "The Iron Horse Express,"

⁷¹ David G. Cotter, LTC, "The Iron Horse Express,"

mission completion in December of 2011. The success of the network could be attributed to experienced sustainers using solutions grounded in math and science along with a in the application of operational art. Whether the use of operational art was intentional or unintentional, historically Operation Iraqi Freedom illustrates the use of operational art within the sustainment warfighting function during major combat operations.

Section 4: Campaign Analysis – 2010: Operation Unified Response

Haiti 2010: Historical Background

On the afternoon of January 12, 2010, a 7.0 magnitude earthquake shattered the Caribbean island nation of Haiti.⁷² The earthquake's epicenter was near the capital of Port au Prince, resulting in debilitating damage to both Port International de Port au Prince and Toussaint Louverture International Airport. According to Haitian government estimates, in addition to massive damage to the Haitian infrastructure, there were 316,000 people killed, 300,000 injured, 1.3 million displaced, 97,294 houses destroyed and 188,383 houses damaged in the Port-au-Prince area and in much of southern Haiti.⁷³

According to initial surveys completed by the United States Agency for International Development Disaster Response Assistance Team (USAID/ DART), the airport had working runways, but the control tower had collapsed. Additionally, the Haitian seaport was unusable with damage to the piers and docks. The resulting damage to the port facilities meant the only facility

⁷² USAID, "Fact Sheet #1, Fiscal Year (FY) 2010," Usaid.gov, January 12, 2010, "BACKGROUND AND KEY DEVELOPMENTS," accessed October 2, 2011, http://www.usaid.gov/ht/docs/eqdocs/ofda_fact_sheets/01.13.10_haiti_factsheet_1.pdf.

⁷³ United States Geological Survey, "Magnitude 7.0 - HAITI REGION," U.S. Geological Survey Earthquake Hazards Program, January 2010, Felt Summary, accessed October 02, 2011, <http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/us2010rja6.php#summary>.

capable of handling freight was the airport. Supporting the people of Haiti was going to be a complex problem.⁷⁴

In the days following the earthquake, the United States deployed forces enabling relief capabilities to support the humanitarian assistance to earthquake victims. A C-17 Globemaster III departed North Carolina and delivered 14,000 Meals Ready-to-Eat, or MREs, and 14,000 quarts of water in a 7-hour round-trip. Due to the proximity to the United States, the use of both sea and air modes to deploy personnel and equipment facilitated a quicker response.

The initial stages of the deployment focused more on the inflow of humanitarian aid than the inflow of personnel and equipment. One thousand troops from the 82nd Airborne arrived within the week after the earthquake, illustrating the need to react quickly to ensure personnel were available to process and distribute the humanitarian supplies.⁷⁵

Since there was not a contingency plan or combat order that dictated the force flow, planners had to anticipate which capability to give priority deployment to support the people of Haiti. In part, the modular structure and standardization of the sustainment forces saved planning time and ensured that the proper units deployed in support of the mission.⁷⁶ The request for forces process focused capabilities to meet specific needs without stressing the deployment process. In short, planners deployed the combat power required to meet the disaster relief mission in Haiti.

The obvious first step of conducting Foreign Humanitarian Aid and Disaster Relief (FHA/DR) is to establish an entry point that is capable of handling the amount of humanitarian

⁷⁴ North Shore Journal, "But People Are Dying – Thoughts on the Haitian Disaster," America's North Shore Journal, January 2010, Media, accessed October 02, 2011, <http://northshorejournal.org/but-people-are-dying-thoughts-on-the-haitian-disaster>

⁷⁵ Los Angeles Times "Food aid trickles to Haitians as Marines, airborne troops join effort" L. A. Times, January 19, 2010, accessed October 02, 2011, <http://articles.latimes.com/2010/jan/19/world/la-fg-haiti-quake19-2010jan19.html>

⁷⁶Paul R. Hayes, "Deploying an Expeditionary Sustainment Command to Support Disaster Relief," *Army Sustainment* 42, no. 6 (November/December 2010),5

aid a disaster requires. The Army's Military Surface Deployment and Distribution Command (SDDC) have an expeditionary answer to the challenge of sustainment support in contingency response operations for the Department of Defense known as the Rapid Port Opening Element (Rapid Port Opening Element).⁷⁷ This capability provides a response package that opens a theater's Aerial Port of Debarkation (APOD) for use within days after requesting the element. In this case, it was forty-eight hours after the earthquake when SDDC had an element at the Aerial Port of Debarkation processing cargo for United States Agency for International Development.⁷⁸ The Joint Task Force- Port Opening Aerial Port of Debarkation (JTF-PO) was a calculated success.

Planners soon realized that the Aerial Port of Debarkation was incapable of maintaining the tempo required to save lives, prevent hunger, and achieve the desired conditions. With the damage at the Sea Port of Debarkation (SPOD) limiting the amount of aid arriving in Haiti, it was evident the Sea Port would be decisive to the success of Operation Unified Response. This required the activation of the second Rapid Port Opening Element. This capability provided the equipment and personnel to open a Sea Port and start processing cargo within twenty-four hours.

Eight days following the earthquake, the Sea Port of Debarkation Joint Task Force-Port Opening arrived with two Army Landing Craft Utility (LCU), containing components for a Sea Port of Debarkation opening package. Following the preparation of a shore-landing site, establishing satellite communication to Surface Deployment and Distribution Command, integrating with United States Agency for International Development, 7th Sustainment Brigade,

⁷⁷ Mike W. Petersen, "Rapid Port Opening Element: Logistics First Responders The United States Army," The Official Home Page of the United States Army The United States Army, November 16, 2009, accessed October 02, 2011, <http://www.army.mil/article/30486/rapid-port-opening-element-logistics-first-responders/>.

⁷⁸ Scott R. Gourley, "JTF Port Opening for Operation Unified Response," Defense Media Network, January 29, 2011, accessed October 2, 2011, <http://www.defensemedianetwork.com/stories/jtf-port-opening-for-operation-unified-response/>

and elements of the Haitian port authority, the Joint Task Force-Rapid Port Opening Element began processing on average 100 Twenty Equivalent Units(TEU) a day to support Joint Task Force-Haiti.⁷⁹ The sustainment network was established and prepared not only for the deployment of personnel and equipment from the United States, but the massive amounts of humanitarian aid that was flowing from many helpful sources.

In addition to the Rapid Port Opening Element, the Joint Task Force utilized the “Super Ferry,” a high-speed vessel, to aid in the deployment of elements from 7th Sustainment Brigade located in Fort Eustis, Virginia.⁸⁰ The use of the Motor Vessel (MV) Huaki allowed the U.S. response to use precision and velocity management that provided the right capabilities of sustainment forces at a tempo to meet the commander’s intent. After the initial security elements from the 82nd arrived, the sustainment personnel focused on airlifting emergency supplies, managing the ports that facilitated the flow of humanitarian aid and by default, discouraged further looting and violence among the survivors of the earthquake.⁸¹

The feedback concerning the success of the Joint Task Force-Rapid Port Opening Element provides an illustration of critical nodes in the sustainment network which affect the tempo of responsiveness when it is important to provide capabilities into a theater as soon as

⁷⁹ The twenty-foot equivalent unit (often TEU or teu) is an inexact unit of cargo capacity often used to describe the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box that can be easily transferred between different modes of transportation, such as ships, trains, and trucks. As defined by Wikipedia accessed October, 2, 2011, http://en.wikipedia.org/wiki/Twenty-foot_equivalent_unit

⁸⁰ The Motor Vessel (MV) Huakai is the second of the two Hawaii Superferry high-speed cats built by Austal for the failed Hawaii ferry operation. Unlike its sister ship, it never entered service. Also unlike its sister ship, it is fitted with a bi-fold stern ramp that may prove particularly useful in Haiti relief operations. The 373-foot Huakai can travel 30+ knots with available seating for in excess of 800 passengers and a cargo deck capacity of 25,000 square feet. Marine Log Magazine, "MARAD to Deploy Former Hawaii Superferry Cat to Haiti," Marine Log Magazine, January 19, 2010, accessed October 02, 2011, <http://www.marinelog.com/DOCS/NEWSMMIX/2010jan00192.html>.

⁸¹ Los Angeles Times “Food aid trickles to Haitians as Marines, airborne troops join effort” L. A. Times, January 19, 2010, accessed October 02, 2011, <http://articles.latimes.com/2010/jan/19/world/la-fg-haiti-quake19-2010jan19.html>.

possible. The decision to follow the Aerial Port of Debarkation element with a Sea Port of Debarkation element improved U.S. responsiveness, allowing the conduct of theater entry simultaneously and in depth, resulting in an increased capability of reaching the Haitian people.

3rd ESC's Efforts in Operation Unified Response

With just twenty-five days left of the 180-day Army Force Generation (ARFORGEN) cycle, the 3d Sustainment Command (Expeditionary) was feeling the effects of manning, equipment, and training limitations.⁸² The Global War on Terror made developing the task organization a challenge, requiring the planning team to research capabilities and forecast possible requirements using units not already allocated to either Afghanistan or Iraq. Almost complete with the personnel and equipment reset that follows deployment, the 3d Sustainment Command (Expeditionary) (ESC) found itself as the lead sustainment unit available to conduct contingency operations in Haiti. With a unit history that includes sustainment operations during the Korean War, three deployments to Iraq since 2003, and a unit movement from Germany to Fort Knox, the 3d Sustainment Command (Expeditionary) has never been called on to conduct contingency operations in an austere environment like the one it was to find in Haiti.⁸³

There were many firsts for the 3d Sustainment Command (Expeditionary) during Operation Unified Response. The obvious one was a deployment into a theater missing the civilian infrastructure the unit had grown accustomed to while supporting Operation Iraqi Freedom.⁸⁴ Another was the 3d Sustainment Command (Expeditionary)'s primary use of Army watercraft allowed operational modes of transportation to support the relief efforts in an effective and economical manner with little dependence on the strategic modes normally required for force

⁸² Paul R. Hayes, "Deploying an Expeditionary Sustainment Command to Support Disaster Relief," *Army Sustainment* 42, no. 6 (November/December 2010), 5

⁸³ "Deploying an Expeditionary Sustainment Command to Support Disaster Relief, 4

⁸⁴ "Deploying an Expeditionary Sustainment Command to Support Disaster Relief, 6

flow. In the case of Operation Unified Response, the application of sustainment was more difficult than sustainment operations in Iraq due to the austerity of the conditions in Haiti and the lack of warning associated with a natural disaster. Operation Unified Response required truly expeditionary operations due to the extensive damage to the infrastructure. The challenge for the 3d Sustainment Command (Expeditionary) was to deploy into an austere environment expeditiously, with the right combat power and an ability to integrate with agencies not normally found in Operation Iraqi Freedom.

There were thirty-four American citizens killed by the earthquake. This provided 3d Sustainment Command (Expeditionary) a line of operation never before utilized. Operation Unified Response was the first time that U.S. Army mortuary affairs assets operated in a fashion that partnered with the Disaster Mortuary Operational Response Team (DMORT) from the Department of Health and Human Services. The combined efforts worked from the Port au Prince airfield to jointly locate, recover, identify, and return the remains of the thirty-four American citizens killed in Haiti.⁸⁵ The operational reach of the Incident Command System, which normally operates within the boundaries of the continental United States, increased by implementing an army capability beyond its traditional roles. In addition to increasing the operational reach of the ICS and DMORT, sustainment units increased the distribution capabilities and operational reach of several non-governmental agencies. According to Major Paul Hayes, the Public Affairs officer for the 3d Sustainment Command (Expeditionary), elements of the 10th Transportation Company (light/medium truck) assisted in the distribution of 12,432 metric tons of rice to approximately three million people. The efforts of this sustainment

⁸⁵ Paul R. Hayes, "A Series of Firsts: The 3d ESC in Operation Unified Response" Army Sustainment 42, no. 6 (November/December 2010),9

unit aided in meeting the endstate of mitigated suffering and providing a foundation for stabilizing the Haitian countryside.⁸⁶

The events that surrounded the 2010 Earthquake provided elements of the 3d Sustainment Command (Expeditionary) an opportunity to respond and meet the requirements of the Combined Joint Task Force-Haiti Commander in conducting disaster relief. The purpose of 3d Sustainment Command (Expeditionary)'s sustainment network was to provide support to relief efforts so that they could maintain a tempo not handicapped by lagging sustainment. The 3d Sustainment Command (Expeditionary) sustainment operations in support of Operation Unified Response were deemed successful. Experience gained during previous operations along with a foundation in operational art led to this success. Historically, efforts in Haiti illustrate the use of operational art within the sustainment warfighting function while deploying and applying humanitarian aid to Haiti earthquake victims in 2010.

The application of Operational Art to the sustainment operation in Haiti was tougher than for major combat operations. The rapid use of military capabilities applied to the ongoing relief efforts in Haiti constitutes a direct operational approach with the center of gravity being Haiti's inability to self-recover and mitigate the suffering. Without the proper application of sustained combat power to the citizens of Haiti, the death toll would have risen exponentially due to the lack of humanitarian aid and services.

Section 5: Conclusion

The mutual understanding among the six chunks, known as warfighting functions, promotes an efficient and effective planning team. Each member of a warfighting function is considered technically and tactically competent upon the completion of each level of education; however, until each of the separate functional areas integrates operational art, there will be a gap

⁸⁶ Paul R. Hayes, "A Series of Firsts: The 3d ESC in Operation Unified Response", 10

in mutual understanding. So how does a leader ensure that his planning team is integrated and has a mutual understanding of the current condition and desired endstate? Moreover, what is the linkage between the six warfighting functions that promotes a mutual understanding between team members, of varying warfighting functions and backgrounds, tasked to confront the unknowns of a future campaign?

The hallmark of operational art is in the integration of temporally and spatially distributed operations into one coherent whole.⁸⁷ In an era of diminishing resources and possible cutbacks, officers who understand operational art will be an invaluable asset to decision-makers.⁸⁸ However, with the multitudes of potentially “new” and “best” technologies distracting the efforts of the operational planner away from the fundamentals, focusing on operational art may be harder than it sounds. Admittedly, there is a time and a place for instituting new technologies, however getting the fundamentals down first is important so a planner can intelligently select useful technologies from the useless ones.

In civilian logistics, there is motivation to understand and communicate effectively in order to make a profit. In military sustainment, there should be motivation to communicate effectively in order to achieve military objectives. The difference in motivations lends to the importance of learning the fundamentals rather than the latest trends in business. Sustainment has its origins in military circles grounded in theory, historical studies, and experiences. Understandably the new business processes are important and have value, however if a planner is not grounded in military fundamentals, the new techniques might do more harm than good. The

⁸⁷James, J. Schneider, “The Loose Marble—and the origins of Operational Art.” *Parameters* XIX (March 1989): 32-40. Accessed September 13, 2011.
<http://www.carlisle.army.mil/usawc/Parameters/Articles/1989/1989%20schneider.pdf>.

⁸⁸James J. Schneider, “Theoretical Implications of Operational Art,” in *On Operational Art*, by Clayton R. Newell and Michael D. Krause (Washington, D.C.: Center of Military History, United States Army, 1994), 29.

challenge for a military planner is integrating new knowledge within the military planning cycle in a manner that facilitates an understanding among the team.

The ability of the operational planner to understand combat power within each of the warfighting functions as they relate to the elements of operational art is essential to the planning process. Using doctrinally correct terms within each of the warfighting functions alone cannot promote shared understanding; using these doctrinal terms in conjunction with the elements of operational art will better enable the operational planner across each of the warfighting functions.

Generally, operational planners come into planning groups with at least fifteen years of warfighting function experience. With each of the six warfighting functions, the combined knowledge pool equates to over ninety years of accumulated military experience. It is impossible for a planner to be an expert in each warfighting function during the span of their career. To work around this impossibility, the planner must be proficient in a common language that allows him to communicate effectively with others outside his warfighting function.

In the preceding pages, a warfighting function either applies or maintains combat power so that a commander has it at his disposal at any given time. Within the full spectrum of operations, combat power can be an armored vehicle at one end of the spectrum and capabilities that deliver humanitarian aid at the other end. Regardless of the form combat power takes, it is combat power that links the warfighting functions to one another.

Fundamentally, the role of the sustainment warfighting function is to apply and/or sustain combat power depending on the operation. A sustainment planner can increase his contribution to a planning team by understanding the fundamentals of operational art and his warfighting function's relationship to combat power. The elements of operational art provide the language and combat power provides the centerpiece for each warfighting function. With the rapidly changing global environment, the planning team must require of its members an understanding of operational art within the context of combat power. Measures should be taken to begin educating planning teams to develop fluency in operational art and an understanding of the role combat

power plays in the planning process. Brief training sessions can expose the team to all the warfighting functions' operating concepts and the doctrinal terminology of operational art, which may result in an improvement of the efficiency of a planning group.

A long-term recommendation for improving the sustainment officer's contribution to the planning effort is an education process that balances the automated sustainment systems and fundamentals of operational art and sustainment. Earlier exposure to sustainment concepts could improve the student's understanding of the sustainment warfighting function capabilities and requirements in regards to building and sustaining combat power. Combine an understanding of operational art to the warfighting function knowledge and the sustainment officer can communicate using terms understood by all warfighting functions. Granted the nation has been at war for the last decade; however, the intermediate education process still focuses mostly on the science and little on the principles gained from experience during operations.

The case studies within this monograph reinforce that operational art provides a common language for all of the warfighting functions. If all members of the planning team are fluent in operational art, this would facilitate the ability to mutually understand the environment. The mutual understanding of the environment will enable the staff to improve its efficiency and effectiveness while facing the unknowns of future campaigns.

The elimination of unknowns is the number one priority of a sustainer, according to the senior logistician in Desert Shield/Desert Storm, LTG Pagonis. Once each unknown no longer threatens a paralyzing surprise, the sustainer can focus on seamless support to the maneuver element.⁸⁹ Early in the course of a sustainer's education, there is plenty of emphasis on understanding the unknowns in the realm of tactical sustainment, but little exposure to operational

⁸⁹ William G. Pagonis and Jeffrey L. Cruikshank, *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*. (Boston: Harvard Business School Press, 1992), 2.

art and the principles of sustainment. Competency in the science of tactical sustainment is not enough, as the complex art of sustainment will certainly overwhelm a tactically focused mind. In the time it takes a sustainer's latest "best practice" spreadsheet to refresh, the world will undoubtedly have already morphed into another unfamiliar and complex set of problems.

Bibliography

- Blackledge, Matthew W. "Professional Talk Logistics." Eagleleadership.org. August 2003. Accessed September 30, 2011. <http://eagleleadership.org/published/ProfessionalsTalkLogistics.pdf>.
- Blumenson, Martin. *Breakout and Pursuit*. Washington, D.C.: Center of Military History, United States Army, 1993.
- Browne, M. Neil, and Stuart M. Keeley. *Asking the Right Questions: a Guide to Critical Thinking*. Upper Saddle River, NJ: Pearson Prentice Hall, 2007.
- Checkland, Peter, and John Poulter. *Learning for Action: a Short Definitive Account of Soft Systems Methodology and Its Use for Practitioner, Teachers, and Students*. Chichester, England: Wiley, 2006.
- Christianson, LTG, USA, Ret, Claude V. "Creating Education Plan Is Key to Developing 'critical Thinkers' in Logistics Community." Www.ansa.org. July 01, 2011. Accessed July 07, 2011. <http://www.ansa.org/publications/ausanews/archives/2011/7/Pages/Creatingeducationplaniskeytodeveloping%E2%80%98criticalthinkers%E2%80%99inlogisticscommunity.aspx>
- Clausewitz, Carl Von. *On War*. Edited by Michael Howard. Translated by Peter Paret. Princeton, NJ: Princeton University Press, 1989.
- Cotter, LTC, David G. "The Iron Horse Express." U.S. Army Logistics University. September/October 2003. Accessed October 10, 2011. http://www.almc.army.mil/alog/issues/sepoct03/iron_horse.htm.
- Department of the Army. *Field Manual 100-5, Operations*. Washington: U.S. Government Printing Office, 1982.
- . *FM 3-0 Operations*. Washington, DC: Headquarters, Dept. of the Army, 2010.
- . *FM 4-0 Sustainment*. Washington, D.C.: Hq. Dept. of the Army, 2009.
- . *FM 5-0 The Operations Process*. Washington, DC: Hq. Dept. of the Army, 2010.
- . *FM 6-0 Mission Command*. Washington, DC: Hq. Dept of Army, 2003.
- Dolman, Everett C. *Pure Strategy: Power and Principle in the Space and Information Age*. London: Frank Cass, 2005.
- Dorner, Dietrich. *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations*. Reading, MA: Addison-Wesley Pub., 1997.
- Eikmeier, Dale C. "Center of Gravity Analysis." *Military Review*, July/August 2004. Accessed August 18, 2011. <http://www.au.af.mil/au/awc/awcgate/milreview/eikmeier.pdf>.
- Fontenot, Gregory, E. J. Degen, and David Tohn. *On Point: the United States Army in Operation Iraqi Freedom*. Fort Leavenworth, Kan.: Combat Studies Institute Press, 2004.
- Garland, Albert N., and Howard McGaw Smyth. *Sicily and the Surrender of Italy*. Washington: Office of the Chief of Military History, Dept. of the Army, 1965.
- Gharajedaghi, Jamshid. *Systems Thinking: Managing Chaos and Complexity: a Platform for Designing Business Architecture*. Amsterdam: Elsevier, 2006.

- Global Security.org. "Operation Vigilant Warrior." GlobalSecurity.org - Reliable Security Information. Accessed October 12, 2011.
http://www.globalsecurity.org/military/ops/vigilant_warrior.htm.
- Gourley, Scott R. "JTF Port Opening for Operation Unified Response." Defense Media Network. January 29, 2011. Accessed October 2, 2011.
<http://www.defensemedianetwork.com/stories/jtf-port-opening-for-operation-unified-response/>.
- Government Accounting Office. *Preliminary Observation of the Effectiveness of Logistics Activities during Operation Iraqi Freedom*. Report. 2003.
- Hammond, John S., Ralph L. Keeney, and Howard Raiffa. "The Hidden Traps in Decision Making." *Harvard Business Review*, September/October 1998.
- Hatch, Mary Jo., and Ann L. Cunliffe. *Organization Theory: Modern, Symbolic, and Postmodern Perspectives*. Oxford: Oxford University Press, 2006.
- Hayes, Paul R. "Deploying an Expeditionary Sustainment Command to Support Disaster Relief." *Army Sustainment* 42, no. 6 (November/December 2010): 4-8.
- Heck, MAJ, Dana C. "Tactical Employment of a Forward Command Post by a Corps Support Group." U.S. Army Logistics University. September/October 2003. Accessed October 10, 2011. http://www.almc.army.mil/alog/issues/SepOct03/Tactical_Employment.htm.
- Juskowiak, MG, USA, Terry, and Michael Williams, COL, USA Ret. "Sustaining Expeditionary Joint Forces." *Army Logistician*, September/October 2003. Accessed October 16, 2011.
http://www.almc.army.mil/alog/issues/SepOct03/sustaining_expeditionary.htm.
- Kem, Jack D. *Design: Tools of the Trade*. Fort Leavenworth, Kan.: U.S. Army Command and General Staff College, U.S. Army Combined Arms Center, 2009.
- Kress, Moshe. *Operational Logistics: the Art and Science of Sustaining Military Operations*. Boston: Kluwer Academic Publishers, 2002.
- Liddell, Hart Basil Henry. *Strategy*. New York, N.Y., U.S.A.: Meridian, 1991.
- Lofgren, COL, USA, Joseph B., and Pete Zielinski, COL USA. "Operation Iraqi Freedom And Logistics Transformation." Dtic.mil. March 30, 2007. Accessed September 25, 2011.
<http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA469592>.
- Marine Log Magazine. "MARAD to Deploy Former Hawaii Superferry Cat to Haiti." Marine Log Magazine. January 19, 2010. Accessed October 02, 2011.
<http://www.marinelog.com/DOCS/NEWSMMIX/2010jan00192.html>.
- Menning, Bruce W. "Operational Art's Origins." In *Historical Perspectives of the Operational Art*, edited by Michael D. Krause and R. Cody. Phillips, 3-21. Washington, D.C.: Center of Military History, United States Army, 2005.
- Mintzberg, Henry. *The Rise and Fall of Strategic Planning: Reconceiving Roles for Planning, Plans, Planners*. New York: Free Press, 1994.
- Mitchell, Steven T. *Operational Art and Its Relevance to Army Logistics*. Thesis, Fort Leavenworth KS/ School of Advanced Military Studies, 99-00. Fort Leavenworth: United States Command And General Staff College, 2000.

- Naughton, Philippe. "Haiti Sea Port Opens for Quake Aid as US Expands Operations - Times Online." *The Sunday Times*. January 21, 2010. Accessed October 02, 2011. http://www.timesonline.co.uk/tol/news/world/us_and_americas/article6997110.ece.
- Needham, Paul, and Christopher Snyder. "Speed and the Fog of War: Sense and Respond Logistics in Operation Iraqi Freedom." *Www.ndu.edu*. January 2009. Accessed October 13, 2011. <http://www.ndu.edu/CTNSP/docUploaded/Case%2015%20Sense%20and%20Respond.pdf>.
- Newell, Clayton. "Logistical Art." *Parameters* XIX (March 1989): 32-40. Accessed September 13, 2011. <http://www.carlisle.army.mil/usawc/Parameters/Articles/1989/1989%20newell.pdf>.
- North Shore Journal. "Air Drop to Aid Haitian Victims of Earthquake." *America's North Shore Journal*. January 2010. Accessed October 02, 2011. <http://northshorejournal.org/air-drop-to-aid-haitian-victims-of-earthquake>.
- . "But People Are Dying – Thoughts on the Haitian Disaster." *America's North Shore Journal*. January 2010. Accessed October 02, 2011. <http://northshorejournal.org/but-people-are-dying-thoughts-on-the-haitian-disaster>.
- O'Brien, Kristina. "Logistics Pioneer: Rear Admiral Henry E. Eccles." *Air Force Journal of Logistics*, Annual, XXXIV, no. 1+2, 74-77. Accessed May 10, 2011. <http://www.aflma.hq.af.mil/shared/media/document/AFD-101122-024.pdf>.
- Osinga, Frans P. B. *Science, Strategy, and War: the Strategic Theory of John Boyd*. London: Routledge, 2007.
- Pagonis, William G., and Jeffrey L. Cruikshank. *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*. Boston: Harvard Business School Press, 1992.
- Petersen, Mike W. "Rapid Port Opening Element: Logistics First Responders | Article | The United States Army." *The Official Home Page of the United States Army | The United States Army*. November 16, 2009. Accessed October 02, 2011. <http://www.army.mil/article/30486/rapid-port-opening-element-logistics-first-responders/>.
- Schneider, James J. "The Loose Marble - and the Origins of Operational Art." *Parameters*, March 1989. Accessed October 14, 2011. <http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA517707>.
- . "Theoretical Implications of Operational Art." In *On Operational Art*, by Clayton R. Newell and Michael D. Krause, 17-30. Washington, D.C.: Center of Military History, United States Army, 1994.
- Senge, Peter M. *The Fifth Discipline: the Art and Practice of the Learning Organization*. New York: Doubleday/Currency, 2006.
- Stewart, Richard W. *Staff Operations the X Corps in Korea, December 1950*. Fort Leavenworth, Kan.: U.S. Army Command and General Staff College, Combat Studies Institute, 1991.
- . *United States Army in Somalia, 1992-1994*. Washington (D.C.): Government Printing Office, 2003.
- Strange, Joe, and Richard Irons. "Understanding Centers of Gravity and Critical Vulnerabilities: Part 1." *Www.au.af.mil*. Accessed August 31, 2011. www.au.af.mil/au/awc/awcgate/usmc/cog1.pdf.

- USAID. "Fact Sheet #1, Fiscal Year (FY) 2010." Usaid.gov. January 12, 2010. Accessed October 2, 2011.
http://www.usaid.gov/ht/docs/eqdocs/ofda_fact_sheets/01.13.10_haiti_factsheet_1.pdf.
- USGS. "Magnitude 7.0 - HAITI REGION." U.S. Geological Survey Earthquake Hazards Program. January 2010. Accessed October 02, 2011.
<http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/us2010rja6.php>.
- . "Magnitude 7.0 - HAITI REGION." U.S. Geological Survey Earthquake Hazards Program. January 2010. Accessed October 02, 2011.
<http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/us2010rja6.php#summary>.
- Van, Creveld Martin. *Supplying War: Logistics from Wallenstein to Patton*. Cambridge: Cambridge University Press, 2004.
- Venner, Jason, Ken Knouse, Gary Russell, Gerald Winterlin, Kenneth Daniell, Tinh Nguyen, and Nancy Benco. *Defense Logistics: Preliminary Observations on the*. Report no. GAO-04-305R Defense Logistics. December 18, 2003. Accessed October 01, 2011.
<http://www.gao.gov/new.items/d04305r.pdf>.
- Wade, Gary H. *Rapid Deployment Logistics Lebanon, 1958*. Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1984.
- Wallis, Eric T. "From Just In Case to Just In Time." U.S. Army Logistics University. May/June 2008. Accessed October 14, 2011.
doi:http://www.almc.army.mil/alog/issues/MayJun08/jitime_vs_jicase.html.
- Westover, John Glendower. *Combat Support in Korea*. Washington, D.C.: Center of Military History, U.S. Army, 1986.
- Wright, Donald P., and Timothy R. Reese. *On Point II: Transition to the New Campaign: the United States Army in Operation Iraqi Freedom, May 2003-January 2005*. Fort Leavenworth, KS: US Army Combined Arms Center, 2008.